



SIERRA VIDEO

Series 10 Distribution Amplifiers

Frames 801014, 801012, 801028, 801017

User's Manual

SERIES 10 DISTRIBUTION AMPLIFIERS

User's Manual

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Table of Contents

Introduction	1		
Warnings & Safety Regulations	1	Audio Modules	13
Warnings	1	Introduction	13
Warnings (continued)	2	501026 Audio DA	13
Cautions	2	Circuit Description	13
Power Supply Cords	2		
North American Power Supply Cords	2	Specifications	15
International Power Supply Cords	2	Audio Specifications	15
EMC Regulatory Notices	3	Video Specifications	16
Delivery Damage Inspection	3		
Factors Affecting Quality of Results	3	Schematics	17
Frame 801014	4	501011	17
Frame 801012	4	501019/ 501519	19
Frame 801028	4	501022	20
Frame 801017	4	501026	21
		Warranty	23
Installation	5		
Introduction	5		
Rack Mounting	5		
1RU Frame	5		
3RU Frame	5		
AC Power Connection	6		
Video Connections	6		
Audio Connections	7		
Video Modules	9		
Introduction	9		
501011 Basic Video DA	9		
Circuit Description	9		
501519 Differential Input Video DA	10		
Circuit Description	10		
501019 Equalizing Video DA	11		
Circuit Description	11		
501022 Pulse DA	12		
Circuit Description	12		

Introduction

The Sierra Video -10 Audio and Video distribution amplifiers offer high performance solutions to your video and audio distribution needs. A wide variety of plug-in modules can be used in a choice of two 3RU (801012 or 801028) or a 1 RU (801014) frame for video. And a 3RU audio frame for stereo or mono configurations.

The frames provide low voltage AC input to each module. The Series 10 modules can be removed or re-inserted with power to the frame either on or off.

The 801012 video frame has 10 separate outputs for each module with slots for up to 10 modules, while the 801028 video frame has 4 outputs for each module with slots for up to 20 modules. Only the outputs which are used need to be terminated.

The 801017 audio frame has 10 balanced outputs for each module with slots for up to 10 modules. Inputs and outputs can be wired for balanced or unbalanced operation.

Warnings & Safety Regulations

The information in the following section provides important warnings and safety guidelines for both the operator and service personnel. Specific warnings and cautions may be found throughout this manual. Please read and follow the important safety precautions noting especially those instructions relating to risk of fire, electrical shock and injury to persons.

Any instructions in this manual that require opening the equipment cover or enclosure are intended for use by qualified service personnel only. To reduce the risk of electrical shock, do not perform any servicing other than what is contained in the operating instructions unless you are qualified.

Warnings

- Heed all warnings on the unit and in the operating instructions.
- Disconnect AC power before installing any options.
- Do not use this product in or near water.
- This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting inputs and outputs.

Warnings (continued)

- Route power cords and other cables so that they are not likely to be damaged, or create a hazard.
- Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch unsafe connections and components when the power is on.
- To avoid fire hazard, use only the specified type, correct voltage, and current rating of fuse. Always refer fuse replacement to qualified service personnel.
- Have qualified personnel perform safety checks after any completed service
- This is an FCC class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take necessary measures.

Cautions

- Use the proper AC voltage to supply power to the switcher. When installing equipment, do not attach the power cord to building surfaces.
- To prevent damage to equipment when replacing fuses, locate and correct trouble that caused the fuse to blow before applying power.
- Use only the recommended interconnect cables to connect the switcher to other frames.
- Follow static precautions at all times when handling the equipment.
- Leave the side, top, and bottom of the frame clear for air convection cooling and to allow room for cabling. Slot and openings in the frame are provided for ventilation and should not be blocked.
- Only an authorized Sierra Video technician should service the switchers. Any user who makes changes or modifications to the unit without the expressed approval of the Sierra Video will void the warranty.

Power Supply Cords

North American Power Supply Cords

This equipment is supplied with North American power cords with molded grounded plug (NEMA-15P) at one end and molded grounding connector (IEC 320-C13) at the other end. Conductors are CEE color coded, light blue (neutral), brown (line), and green/yellow (ground). Operation of the equipment at voltages exceeding 130VAC will require power supply cords that comply with NEMA configurations.

International Power Supply Cords

If shipped outside North America, this equipment is supplied with molded ground connector (IEC 320-C13) at one end and stripped connectors (50/5mm) at the other end. Connections are CEE color coded, light blue (neutral), brown (line), and green/yellow (ground). Other IEC 320-C13 type power cords can be used if they comply with safety regulations of the country in which they are installed.

EMC Regulatory Notices

Federal Communications Commission (FCC) Part 15 Information: This device complies with Part 15 of the FCC standard rules. Operation is subject to the following conditions:

This device may not cause harmful interference

This device must accept any interference received including interference that may cause undesirable operations.

Delivery Damage Inspection

Carefully inspect the frame and exterior components to be sure that there has been no shipping damage. Make sure all modules are seated correctly and have not detached during shipment.

Factors Affecting Quality of Results

There are many factors affecting the quality of results when signals are transmitted from a source to a destination.

Signal cables — Use only the best quality cables to avoid interference and degraded signal quality and elevated noise levels.

Sockets and connectors of the sources and destinations — Use only the highest quality, since "zero ohm" connection resistance is the target. Connectors should also match the required impedance (75 ohm in video) to minimize return loss.

Amplifying circuitry — Must have quality performance when the desired end result is high linearity, low distortion, and low noise.

Distance between sources and destinations — Plays a major role in the final result. For long distances (over 15 meters) between sources and destinations, special measures should be taken to avoid high frequency cable losses. These measures include using higher quality cables and/or adding line cable equalizing amplifiers.

Interference from neighboring electrical appliances — These can have an adverse affect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio should be installed away from any main power lines, electric motors, transmitters, etc. even when the cables are shielded.

CAUTION!

Only an authorized Sierra Video technician can service these products. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void the warranty

Use the proper AC voltage to supply power.

Frame 801014



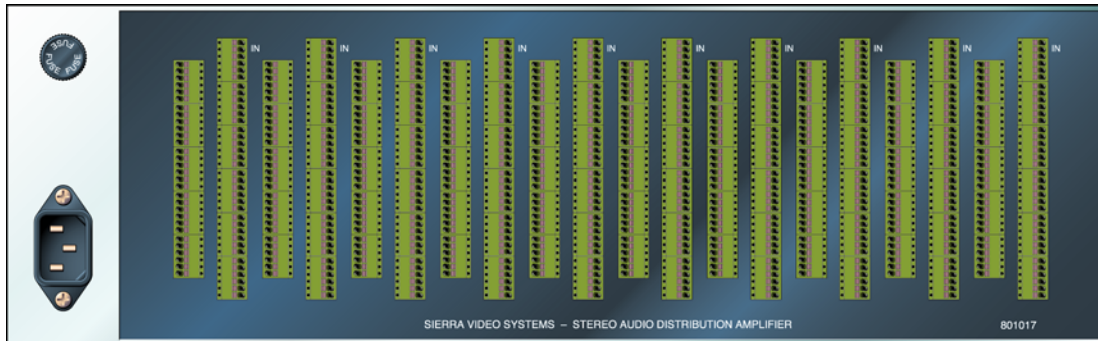
Frame 801012



Frame 801028



Frame 801017



Note

The models shown here and in the subsequent sections are non-redundant power video and audio frames. These models also offer redundant power supplies. Consult the rear panel serial number and model number to verify your order and product.

Installation

Introduction

Installation procedures are similar for all frames covered under this manual. Exceptions, if any, have been noted in each of the following paragraphs.

Rack Mounting

Carefully inspect the frame to ensure that there has been no shipping damage. Make sure all shipping material is removed from the router frame.

Each of the frames described in this manual can be rack mounted in a standard 19" (RU) EIA rack assembly and includes rack "ears" at the ends of the front of the frames. None of the models require spacing above or below the unit for ventilation. If ample space exists, a 1RU spacing gap is recommended.

To rack mount any of the frames, simply place the unit's rack ears against the rack rails of the rack, and insert proper rack screws through each of the holes in the rack ears. Always rack mount the unit prior to plugging into a power receptacle or attaching any cables.

1RU Frame

The 1RU 801014 video frame is 8.5 inches deep. No rear support is needed. The frame produces very little heat and can be installed adjacent to other equipment. The 1RU frame can be installed in all but the most severe situations without allocating any rack space for cooling.

The 1RU frame uses an external power supply. The supply has a 1 meter long output cable with a 3 pin DIN receptacle on it. The DIN connector should be plugged in before the power supply is connected to AC.

3RU Frame

The 3RU 801012, 801028, and 801017 frames are 8.5 inches deep. No rear support is needed. The frames produce very little heat and can be installed adjacent to other equipment. The 3RU frames can be installed in all but the most severe situations without allocating any rack space for cooling.

If a dual supply is used, be sure the second supply is powered from a separate AC power circuit.

AC Power Connection

Before connection of AC power to the #RU frames check the setting of the 115/230 switch. The switch is accessed by removing the front cover. Behind the right side door retainer, you will see the switch. If set to the incorrect voltage, use a small flat blade screwdriver to move the switch to the correct setting.

After connecting the AC, turn on the power switch, check for illumination of the power status LED above the power switch.

Video Connections

There are two BNC connectors associated with the input of each video amplifier module. This is called a “looping” input. This allows a signal connected to one of these connectors to be available on the second connector.

Note:

If the second connector is unused it must be terminated with 75 ohms.

Video system interconnects are made by using 75 ohm transmission lines (coax cable). The device driving the line has a “source” impedance of 75 ohms, the cable has a 75 ohm impedance and the end of the interconnect must be terminated with 75 ohms (see note above).

The accuracy of the termination affects signal level. Use either a 1% or 0.1% termination. Unused amplifier positions do not need a termination.

The 801012 and 801014 frames have ten separate outputs for each module. The 801028 frame has four outputs for each module. Only the outputs which are used need to be terminated.

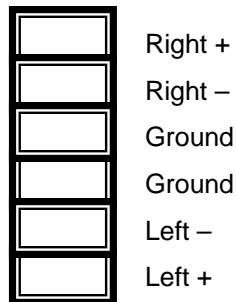
Audio Connections

The Series 10 audio distribution amplifier frame (801017) uses a terminal strip design containing 6 pin removable connectors for input and output connections. Each 6 pin section of the strip that is fixed to the rear of the frame mates with an un-pluggable mating half to which the actual wires are connected. This 6 pin group is one balanced stereo audio line.

On the strips with 6 connectors, each connector is configured as follows;



On the strips with 5 connectors, each connector is configured as follows;



Note:

Be sure to be consistent with “+” and “-” connections to maintain correct audio phase.

Mono modules use only the Right inputs and outputs on the 801017 frame.

Connections are silk-screened on the rear panel.

If the signal is balanced with no shield, omit the Ground connection.

If the signal is un-balanced, connect to the “+” and Ground. Leave the “_” pin open.

Video Modules

Introduction

Sierra Video makes a complete line of high performance 10 output video distribution amplifiers for broadcast, production, and presentation applications.

Each of the frames in the Series 10 DAs use 10 output plug-in modules. Modules can be loaded into frames can be different types. Frames only supply power and I/O connections.

501011 Basic Video DA

The 501011 Basic Video DA is the SVS low noise, low distortion, 150 MHz bandwidth 1x10 plug-in DA module.

Circuit Description

The 501011 is a plug-in module. Refer to the 501011 schematic diagrams in the schematic section of this manual.

The 501011 is powered by low voltage AC which comes into the module through the edge connector. When dual supplies are ordered, the two supplies enter the 501011 separately and are paralleled after the AC to DC rectification. This provides total in-frame isolation between the two supplies. U5 provides regulated +5VDC and U4 provides regulated -5VDC. On the front edge of the 501011 separate LEDs indicate the presence of the + and - 5 VDC levels.

Input video enters on the edge connector pin 2. The incoming signal's shield enters on pin 1 and is then connected directly to the circuit ground.

The 501011 employs a two stage gain process. First a current feedback op amp provides the variable gain via the trim pot in its feedback loop. The gain is set by trim pot R28 located on the front of the 501011.

Next, there are two more of the same op amps each feeding the 75 Ohm source terminated signals.

501519 Differential Input Video DA

The 501519 eliminates the effects of power line hum caused by circulating ground currents in the coaxial cable shield. The differential input circuitry also rejects unwanted common-mode signals induced by stray magnetic fields and electrostatic interference.

Circuit Description

The 501519 is a plug-in module. Refer to the 501519 schematic diagrams in the schematic section of this manual.

The 501519 is powered by low voltage AC which comes into the module through the edge connector. When dual supplies are ordered, the two supplies enter the 501519 separately and are paralleled after the AC to DC rectification. This provides total in-frame isolation between the two supplies. The rectified DC is filtered by C21 and C20. U4 provides regulated +8VDC and U3 provides regulated -8VDC. On the front edge of the 501519 separate LEDs indicate the presence of the + and - 8VDC levels.

Input video enters on the edge connector pin 2. The incoming signal's shield enters on pin 1.

Both signal and shield are AC coupled to the amplifier (C2 and C3). R2 and R4 provides a DC reference for the signal to ground. R1 and C1 bypass high frequency shield noise to ground. Q1 through Q8 comprise a differential amplifier. Q2 and Q3 are each configured as constant current sources of about 3.5 ma. Q5 and Q6 operate differentially. Common mode, undesirable signals present no voltage across R22. The voltage difference between the center conductor of the input and shield is the desired voltage. The voltage across R22 will cause a differential current swing at the collectors of Q5 and Q6. Q4 and Q7 are a differential input to single ended output current mirror. The signal at the collector of Q4 is a current equal to the differential current at the collectors of Q5 and Q6. By varying the resistive load at this point the voltage gain of the overall amplifier is set. R23 is a 15 turn potentiometer gain adjustment located on the front of the 501519.

U2 is a low frequency amplifier used to correct the overall DC of the 501519. The voltage at the output of the module is compared to ground. The required correction signal changes the bias of the current mirror via Q8.

The remainder of the circuit on the 501519 is a high quality 10 load video distribution amplifier. The basic element is a 120MHz amplifier U1 followed by a current boosting stage.

Q9 and Q10 are inside the gain determining feedback loop of U1. D10 and D11 provide class AB operating bias for Q9 and Q10. Q9 and Q10 are 200MHz 500ma devices. They provide a very low output impedance (about 0.1). R36 through R43 are each precision 75ohm resistors. Each drives a separate output line.

501019 Equalizing Video DA

The coaxial cable used in distributing video signals is not a perfect transmission medium. For signals of primary importance, lengths of 15 meters or more should be equalized to restore the higher frequency detail in the video signal and to preserve signal quality. The adjustable equalization range of the 501019 is up to 300 meters of RG59.

Circuit Description

The 501019 is a plug-in module. Refer to the 501019 schematic diagrams in the schematic section of this manual.

The 501019 is powered by low voltage AC which comes into the module through the edge connector. When dual supplies are ordered, the two supplies enter the 501019 separately and are paralleled after the AC to DC rectification. This provides total in-frame isolation between the two supplies. The rectified DC is filtered by C21 and C20. U4 provides regulated +8VDC and U3 provides regulated -8VDC. On the front edge of the 501019 separate LEDs indicate the presence of the + and - 8VDC levels.

Input video enters on the edge connector pin 2. The incoming signal's shield enters on pin 1.

Both the signal and shield are AC coupled to the amplifier (C2 and C3). R2 and R4 provides a DC reference for the signal to ground. R1 and C1 bypass high frequency shield noise to ground. Q1 through Q8 comprise a differential amplifier. Q2 and Q3 are each configured as constant current sources of about 3.5ma. Q5 and Q6 operate differentially. Common mode, undesirable signals present no voltage across R22. The voltage difference between the center conductor of the input and shield is the desired voltage. This voltage across R22 will cause a differential current swing at the collectors of Q5 and Q6. Q4 and Q7 are a differential input to single ended output current mirror. The signal at the collector of Q4 is a current equal to the differential current at the collectors of Q5 and Q6. By varying the resistive load at this point the voltage gain of the overall amplifier is set. R23 is a 15 turn potentiometer gain adjustment located on the front of the 501019.

The network consisting of R14, R15, R16, R17, C7, C8, C9 and C10 is a four pole equalizing network. The amount of effect the network is allowed to have on the overall circuit is adjusted by R22. At one end the network is shorted out to itself and the input circuit gain is flat with respect to frequency. At the other end of R22's adjustment range the network is connected across the emitters of Q5 and Q6. The frequency response of the input circuit is then frequency dependent. This produces the desired response to counteract the response loss of long lengths of input cable. The amount of cable the 501019 compensates for is continuously adjustable by the setting of R22.

U2 is a low frequency amplifier used to correct the overall DC of the 501019. The voltage at the output of the module is compared to ground. The required correction signal changes the bias of the current mirror via Q8.

The remainder of the circuit on the 501019 is a high quality 10 load video distribution amplifier. The basic element is a 120MHz amplifier, U1, followed by a current boosting stage.

Q9 and Q10 are inside the gain determining feedback loop of U1. D10 and D11 provide class AB operating bias for Q9 and Q10. Q9 and Q10 are 200MHz 500ma devices. They provide a very low output impedance (about 0.1 ohm). R36 through R43 are each precision 75 ohm resistors. Each drives a separate output line.

501022 Pulse DA

The 501022 is a plug-in module specifically designed to drive 10 loads with 4V p-p composite sync and similar drive pulses.

Circuit Description

The 501022 is a plug-in module. Refer to the 501022 schematic diagrams in the schematic section of this manual.

The 501022 is powered by low voltage AC which comes into the module through the edge connector. When dual power supplies are ordered, the two supplies enter the 501022 separately and are paralleled after the AC to DC rectification. This provides total in frame isolation between the two supplies. The rectified DC is filtered by C8 and C9. U2 provides regulated +8VDC. U3 is an LM337, adjustable negative voltage regulator. The adjustment input of U3 is connected to a well filtered sample of the raw input voltage. In this way U3 provides filtering and current limit protection, but does not regulate to a specific voltage. This results in a negative supply voltage that slowly follows changes in the raw low voltage AC input. The result is about -19 to -14 volts at the output of U3. On the front edge of the 501022 separate LEDs indicate the presence of the + and – VDC levels.

Input video enters the 501022 on the edge connector pin 2. The incoming signal's shield enters the 501022 on pin 1 and is then connected directly to the circuit ground.

Q3 and Q4 clip signal levels over 6 volts peak to peak. This occurs only if the input connection is accidentally unterminated. The basic element of the 501022 is a 120MHz amplifier, U1, followed by a current boosting stage.

Q1 and Q2 are inside the gain determining feedback loop of U1. D1 and D2 provide class AB operating bias for Q1 and Q2. Q1 and Q2 are 200MHz 500ma devices. They provide a very low output impedance (about 0.1 ohm). R1 through R10 are each precision 75 ohm resistors. Each drives a separate output line.

The gain of the 501022 is set by U1's feedback network. R19 is a 15 turn potentiometer gain adjustment located on the front of the 501022.

Audio Modules

Introduction

The 501026 is a high performance fully differential distribution amplifier designed for demanding applications. Using surface mounted components to increase density, each board is capable of driving 10 separated outputs with user adjustable gain range of -6 dB to $+18$ dB. The unit can be purchased optimized for mono or stereo use, jumper selected 600 ohm or High impedance inputs, and with either 600 ohm or low impedance outputs, better than 110 dB dynamic range and 5 Hz to 150 KHz frequency response there are very few audio devices available today which matches the flexibility and specifications of the 501026.

Note:

Mono modules use only the Right inputs and outputs on the 801017 frame.

501026 Audio DA

Circuit Description

The circuit consists of 2 parts a differential input stage and a differential output capable of supplying high output currents.

U1A (U4A) and associated components make up the input stage. The circuit has -6 dB of gain, $> 40K$ ohm input impedance, > 60 dB common mode rejection. Each input can also be configured using a jumper to be 600 ohm input impedance is desired. The frequency response is set by 100 pf capacitors and 10K ohm resistors and the high end (150 KHz) and a unique DC restoration feedback circuit U1B (U4B) which sets the low frequency -3 dB point at well under 10 Hz without passing the audio signal direction through a capacitor.

U1C (U4C) is a high current driver stage with a coarse and fine gain adjustment available. U1D (U4D) is a high current driver stage which is an inverted copy of the output of U1C (U4C). These combine to form the fully differential output which is connected to all 10 outputs through isolation resistors. In the low output impedance version, these resistors are 10 ohm resulting in less than 0.09 dB gain error when driving any number of loads each of which is $> 2K$ ohm. In the 600 ohm version, these resistors are 300 ohms resulting in the perfect impedance match for driving extremely long line requiring telephone line 600 ohm terminations.

Specifications

Audio Specifications

Stereo and Mono Audio	
Input	
Impedance	> 40K ohms balanced or 600 ohm balanced (jumper selectable)
Level	+ 24 dBu Max
CMRR	> 70 dB
Output	
Impedance	< 20 ohm balanced or 600 ohm balanced
Level	+ 25 dBu Max
Frequency Response	± 0.1 dB 10 Hz to 20 KHz
Distortion	THD < 0.02% 20 Hz to 20 KHz at all levels < +24 dBu
Noise	< 86 dBu 20 Hz to 20 KHz un-weighted
Gain Range	Continuously adjustable from +20 dBu to -3 dBu

Video Specifications

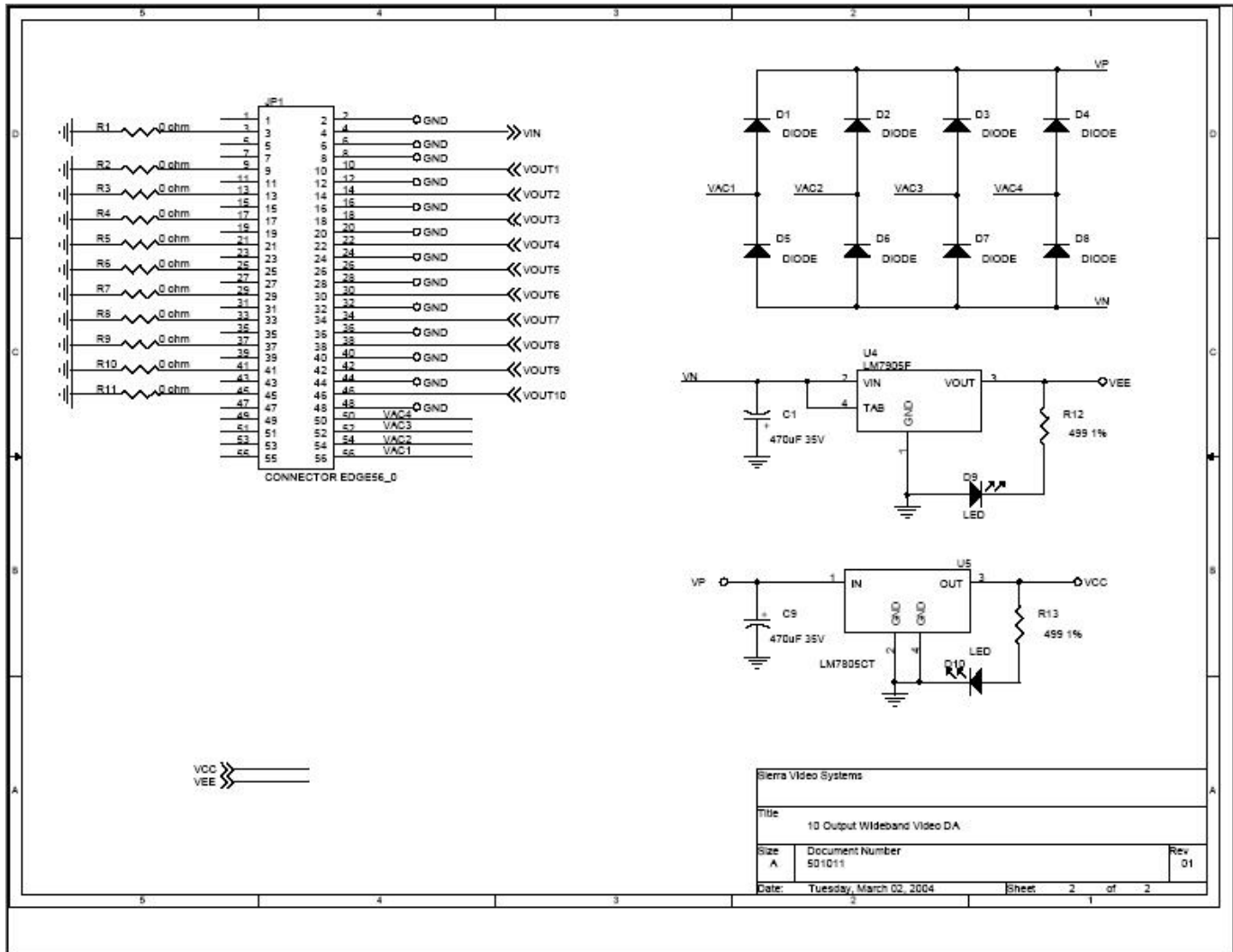
501011 Basic Video DA	
Nominal Input Level	1V p-p
Maximum Input Level	1.5V p-p
Input Impedance	High-Z Looping
Input Return Loss	40db @ 5MHz
Superimposed Input DC	$\pm 5V$
Impedance	75ohms
Output Return Loss	35db @ 5Mhz
DC on Signal	± 50 mV
Isolation Between Outputs	30db @ 5MHz
Nominal Gain	Unity
Gain Adjustment Range	± 3 db
Frequency Response	+0/-3db to 150MHz
Differential Phase Error	± 0.1 degree @ 3.58 or 4.43MHz
Differential Gain Error	$\pm 0.1\%$ @ 3.58 or 4.43MHz
Signal to Noise Ratio	80db to 5MHz
Bandwidth	150MHz
501519 Equalizing Video DA and 501019 Differential Input Video DA (Same as 501011 Except ;)	
Common Mode Rejection	40db @ 60Hz
Common Mode Voltage Range	$\pm 5V$

Sierra Video Systems

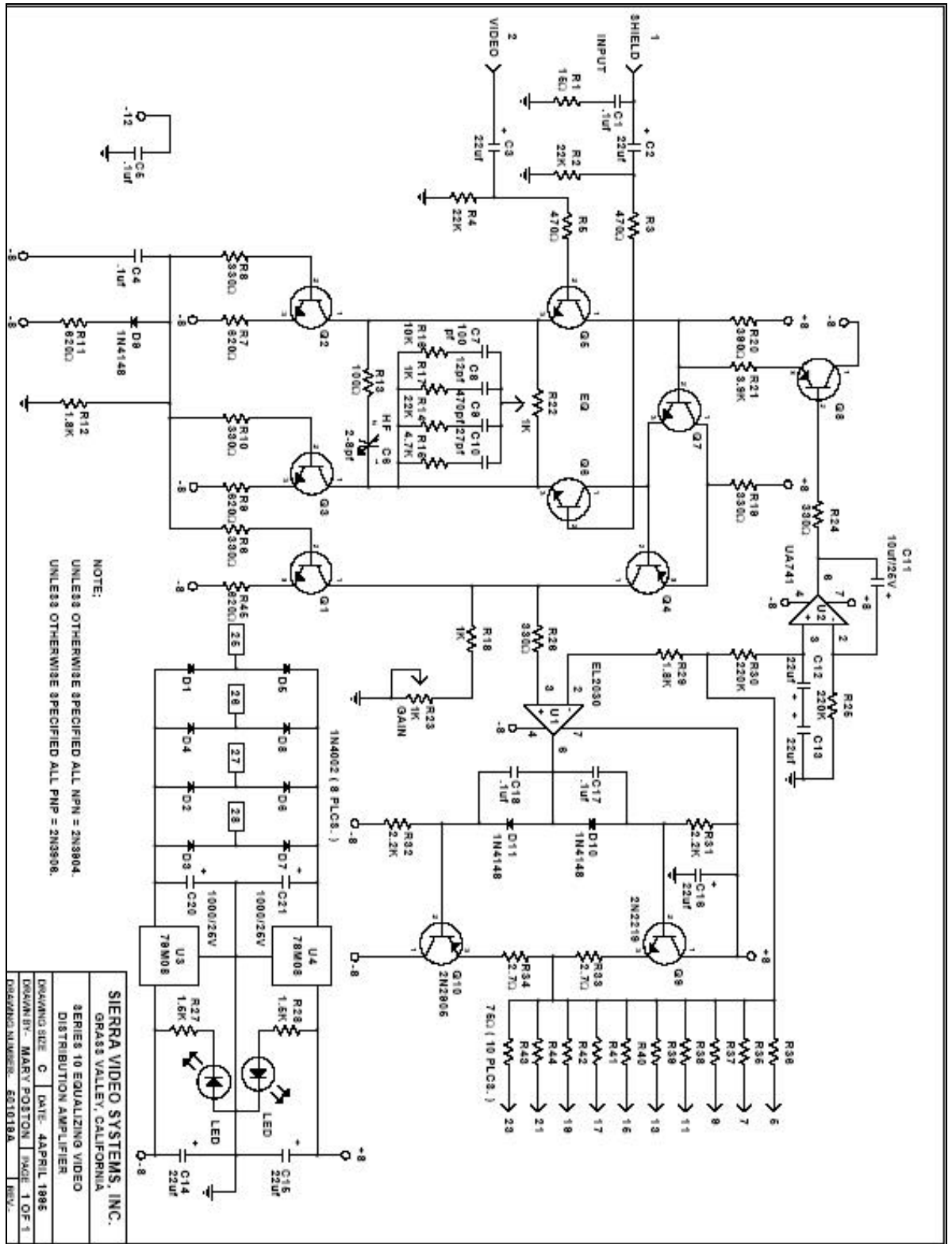
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Size A Document Number 501011 Rev D1

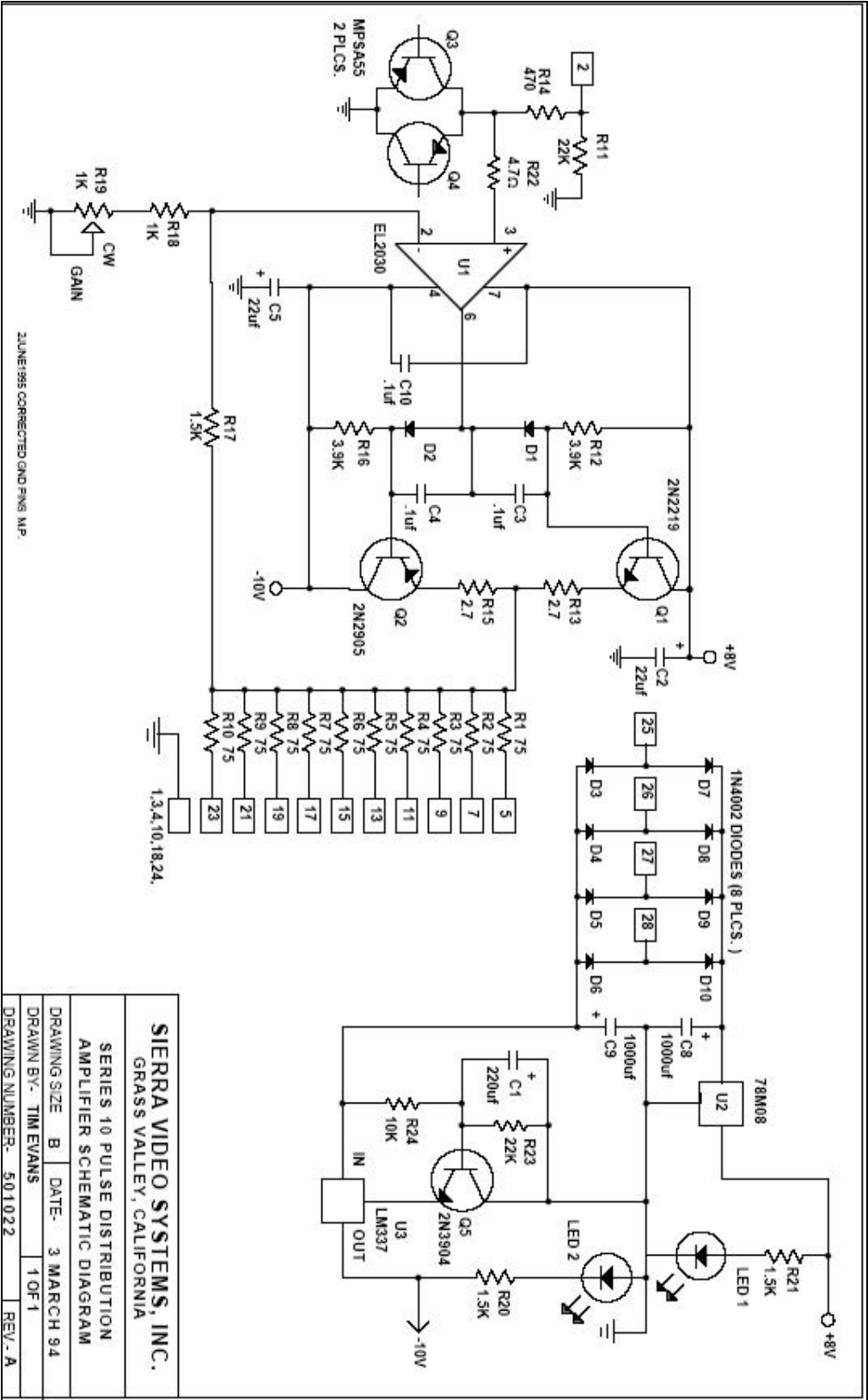
Date: Tuesday, March 23, 2004 Sheet 1 of 2



501019/ 501519



501022





Warranty

A. General

Buyer assumes all responsibility for ascertaining the suitability of Sierra Video (hereinafter "SVS") products for Buyer's intended use. No product sold by SVS is designed or manufactured for use in any manner or under any conditions other than those described in SVS's instruction manuals and other printed material for each particular product. If any product is used or applied in a manner or under conditions not specifically authorized by such written materials or if any product is used by unqualified or improperly trained personnel, Buyer agrees that SVS shall have no liability of any kind arising from such use, and Buyer agrees to indemnify and hold SVS harmless from any claims of third parties arising from such use, and Buyer shall provide SVS with counsel of SVS's choice to defend against such claims.

B. Limited Warranty

1. This limited warranty applies only to the original purchaser and is non-transferable. This limited warranty begins on the date of purchase and will be in effect for seven (7) years for new equipment and for three (3) years for "Factory Refurbished" equipment. Power Supplies and fans are warranted for three (3) years from the date of purchase for new equipment and two (2) years for "Factory Refurbished" units, from the date of purchase.

Buyer must obtain a Return Material Authorization ("RMA") number from SVS prior to returning a product for repair. If, in SVS' sole discretion, the product is found to be defective during the term of this warranty, SVS will at its option: (a) provide free replacement parts, and/or (b) repair the unit at an SVS facility. During the warranty period, SVS will make every reasonable effort to support critical emergencies by supplying no-cost loan equipment while the defective unit is being repaired. SVS will provide replacement parts and/or factory service at no charge. Buyer bears the cost of shipping products returned to SVS under this warranty. SVS will bear the cost of shipping repaired products or replacement parts to the Buyer.

This limited warranty shall not apply to any of SVS's goods which have been altered or which have been subjected to misuse, mishandling, improper storage or negligence. The aforementioned provisions do not extend the original warranty period of any goods which have been replaced by SVS. This limited warranty shall not apply to any goods not of SVS's manufacture, Buyer to be entitled only to the warranty set forth in the original manufacturer's limited warranty.

THIS LIMITED WARRANTY IS EXPRESSED IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON SVS'S PART.

SVS neither assumes nor authorizes any other person to assume for SVS any other liabilities in connection with the sale of products of its own manufacture.

2. SVS's liability hereunder on any claim of any kind, except as set forth herein for any loss, injury to person or property or damage, shall in no case exceed the price allocable to the goods which give rise to such claim.

3. In no event shall SVS be liable for any damages or injuries to person or property if any goods do not meet the above limited warranty, including, without limitation, incidental expenses or consequential or special damages, except as set forth in such limited warranty. The foregoing states the exclusive remedy of Buyer and the exclusive liability of SVS for any breach of the foregoing limited warranty.

C. Cancellation

Except as provided in paragraph B immediately above, all sales are final, and Buyer may cancel this order or return products only upon written consent of SVS.

D. General

In the event of a breach of any of the terms hereof, the non-breaching party shall be entitled to recover all of its costs, fees, and expenses, including, without limitation, reasonable attorney's fees, from the breach party incurred as a result of such breach, regardless of whether or not a suit is actually filed to enforce the terms hereof.

The provision hereof shall be governed by the laws of the State of California (excluding its choice of law provisions).

The headings are for convenience only and do not limit or amplify the terms and provisions hereof.

In case any one or more of the provisions set forth herein shall be held to be invalid, illegal, or unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions contained herein shall not in any way be affected or impaired thereby.

No waiver, alteration, or modification of any of the provisions hereof shall be binding unless in writing and signed by an authorized Officer of SVS.

NOTE:

All products returned to SVS for service must have prior approval. Return authorization requests may be obtained from your SVS dealer.